

What is claimed is:

1. A compact, vehicle-mounted antenna, comprising:
a base having an upper surface, the upper surface of the base being at least partially
5 covered with a conductive material, thereby forming a ground plane; and
an antenna element positioned on the upper surface of the base, the antenna element
comprising:
a platform substantially parallel to and spaced apart from the ground plane,
a ground connecting the ground plane to an end of the platform, the ground
10 extending from the ground plane at an angle substantially perpendicular to the upper surface
of the base, and
a feed connecting the base to the platform, a portion of the feed being slanted
relative to the base as the feed extends from the base toward the platform.
- 15 2. The antenna of claim 1, wherein a distance between the ground plane and
the platform is larger than a corresponding distance in an equivalent planar-inverted-F
antenna.
3. The antenna of claim 1, wherein the antenna element is configured to
20 transmit and receive electromagnetic waves in a band substantially between about 1850 and
about 1990 MHz.
4. The antenna of claim 1, wherein the angle of the feed is adjusted so that the
antenna element has a desired height.
- 25 5. The antenna of claim 1, wherein the end of the platform is an inward-facing
end, the platform further comprising an opposite outward-facing end that extends beyond an
edge of the base.
- 30 6. The antenna of claim 5, wherein the outward-facing end forms a capacitive
coupling with a fringe field at the edge of the ground plane.
7. The antenna of claim 1, wherein the antenna element is a first antenna
element, the platform is a first platform, the ground is a first ground, and the feed is a first
35 feed, the antenna further comprising:

a second antenna element positioned on the upper surface of the base, the second antenna element comprising:

- 5 a second platform substantially parallel to and spaced apart from the ground plane,
a second ground connecting the ground plane to an end of the second platform, and
a second feed connecting the upper surface of the base to the second platform.

8. The antenna of claim 7, wherein the first and second antenna elements are positioned on opposite halves of the base.

- 10 9. The antenna of claim 8, wherein the first and second antenna elements have outward-facing ends that are directed substantially parallel to, but opposite of each other.

10. The antenna of claim 7, wherein the first and second antenna elements are substantially height matched.

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11. The antenna of claim 1, further comprising an additional antenna element positioned on the upper surface of the base.

12. The antenna of claim 11, wherein the additional antenna element is part of a
20 global positioning system (GPS) receive antenna.

13. The antenna of claim 11, wherein the additional antenna element is part of a satellite radio receiver.

- 25 14. The antenna of claim 1, wherein the antenna is positioned within a portion of a roof rack of a vehicle.

15. The antenna of claim 14, wherein the antenna is enclosed within an antenna housing, and the roof rack portion has a recess shaped to receive the antenna housing when
30 the roof rack and the antenna housing are installed.

16. The antenna of claim 1, wherein the antenna is positioned within and enclosed by a housing, the housing being located near a rearview mirror assembly of a vehicle.

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17. An antenna element for use in a compact, vehicle-mounted antenna, comprising:
a single conductive strip, the conductive strip being bent and overlapped to form a platform, a sloped segment, and an approximately vertical segment,
5 the conductive strip being configured to transmit and receive electromagnetic transmissions in a predetermined band.
18. A compact, vehicle-mounted antenna, comprising:
a ground conductor; and
10 an antenna element coupled to the ground conductor, the antenna element having a platform substantially parallel to and spaced apart from the ground conductor, the platform having a radiating lip that projects outwardly over an edge of the ground conductor by a predetermined distance, the platform being supported above the ground conductor by a ground and a feed,
15 wherein the radiating lip forms a capacitive coupling with the edge of the ground conductor, the capacitive coupling partially contributing to an impedance of the antenna element.
19. The antenna of claim 18, wherein the predetermined distance is selected to
20 partially contribute to the impedance of the antenna element such that the impedance creates an impedance match with a transmission line electrically coupled to the antenna element when the antenna element is tuned to a desired frequency.
20. A compact, vehicle-mounted antenna, comprising:
25 a first antenna element configured to transmit and receive electromagnetic transmissions in a first band, the first antenna element having a first feed;
a second antenna element configured to transmit and receive electromagnetic transmissions in a second band different than the first band, the second antenna element having a second feed; and
30 a conductive feed line electrically coupling a transmission line to the first feed and the second feed, wherein a length of the feed line between the first feed and the second feed creates an impedance such that the second antenna element appears to be substantially an open circuit in the first band.

21. The multiband antenna of claim 20, further comprising at least one additional antenna positioned substantially between the first antenna element and the second antenna element, the additional antenna being configured to at least one of receive and transmit electromagnetic transmissions in one or more additional bands.

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22. The multiband antenna of claim 21, wherein the at least one additional antenna is a global positioning system (GPS) receive antenna.

23. The multiband antenna of claim 20, wherein the first and second antenna elements are attached to a base, and wherein one of the first and second antenna elements has a radiating lip that projects beyond the base.

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24. The multiband antenna of claim 20, wherein the feed line has a width selectively adjusted to match the impedance of a transmission line electrically coupled to the feed line.

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25. The multiband antenna of claim 20, wherein the first band is between about 824 and about 894 MHz, and the second band is between about 1850 and about 1990 MHz.

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26. The multiband antenna of claim 20, wherein the antenna is positioned within a portion of a roof rack of a vehicle.

27. The multiband antenna of claim 26, wherein the antenna is enclosed within an antenna housing that positioned within the roof rack portion.

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28. The multiband antenna of claim 20, wherein the antenna is positioned within and enclosed by a housing, the housing being located near a rearview mirror assembly of a vehicle.

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29. A vehicle-mounted, multiband antenna, comprising:
a base having a conductive ground surface;
a first antenna element positioned on the base and being configured to receive and transmit electromagnetic radiation in a first band, the first antenna element comprising a first support, a first feed, and a first platform substantially parallel to and spaced apart from

the ground surface, the first platform having an inward-facing end and an outward-facing end;

5 a second antenna element positioned on the base and being configured to receive and transmit electromagnetic radiation in a second band different than the first band, the second antenna element comprising a second support, a second feed, and a second platform substantially parallel to and spaced apart from the ground surface, the second platform also having an inward-facing end and an outward-facing end,

10 the first and second antenna elements being positioned on the base such that the outward-facing ends of the first and second antenna elements face substantially opposite directions; and

at least one additional antenna element positioned substantially between the first antenna element and the second antenna element, the additional antenna element being configured to receive and/or transmit electromagnetic radiation in one or more additional bands.

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30. The antenna of claim 29, wherein the first antenna element and the second antenna element are positioned in axial alignment with one another.

20 31. The antenna of claim 29, wherein the first feed and the second feed are electrically coupled to a transmission line via a single feed line.

25 32. The antenna of claim 31, wherein the single feed line is located on the lower surface of the base, and wherein a segment of the feed line between the first feed and the second feed creates an impedance such that the second antenna element appears to be substantially an open circuit in the first band.

33. The antenna of claim 29, wherein a portion of the second feed of the second antenna element is angled such that the second antenna element has a desired height and remains configured to transmit and receive electromagnetic radiation in the second band.

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34. The antenna of claim 33, wherein the second antenna element is height matched with the first antenna element.

35 35. The antenna of claim 33, wherein the angled portion of the second feed is angled away from the second support.

36. The antenna of claim 33, wherein the first antenna element is a planar-inverted-F antenna.

5 37. The antenna of claim 29, wherein the additional antenna element is a global positioning system (GPS) receive antenna.

38. The antenna of claim 29, wherein the additional antenna element is a satellite radio receiver.

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39. The antenna of claim 29, wherein the first band is substantially between about 824 and about 894 MHz, and the second band is substantially between about 1850 and about 1990 MHz.

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40. The antenna of claim 29, wherein the outward-facing end of the second antenna element extends beyond an edge of the ground surface and forms a capacitor with the edge of the ground plane, the capacitance of the capacitor contributing to an impedance of the second antenna element.

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41. The antenna of claim 40, wherein the capacitance is selectively adjusted to create an impedance match with a transmission line.

42. The antenna of claim 29, wherein the antenna is positioned within a portion of a roof rack of a vehicle.

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43. The antenna of claim 42, wherein the antenna is enclosed within an antenna housing that is positioned within the roof-rack portion.

44. The antenna of claim 29, wherein the antenna is positioned within and
30 enclosed by a housing, the housing being located near a rearview mirror assembly of a vehicle.

45. A vehicle-mounted, communicating antenna, comprising:
a first antenna element for communicating over a first wavelength range;

- a second antenna element for communicating over a second wavelength range different from the first wavelength range, the second antenna element being separated from and in general axial alignment with the first antenna element; and
- a third antenna element positioned between and in general axial alignment with the
- 5 first and second antenna elements.

46. The antenna of claim 45, wherein the first and second antenna elements are oppositely oriented to increase electrical isolation relative to each other.
- 10 47. The antenna of claim 45, wherein the first and second antenna elements are tuned, shaped, and/or positioned relative to each other to reduce loss of performance.
48. The antenna of claim 45, wherein the signals from the first and second antenna elements are communicated as analog signals via a single transmission line to a
- 15 circuit within the vehicle.